

**STS-105 ORBITER POST LANDING INSPECTION
DEBRIS ASSESSMENT
22 August 2001**

After the 2:23 p.m. local/eastern time landing on 22 August 2001, a post landing inspection of OV-103 Discovery was conducted at the Kennedy Space Center on SLF runway 15 and in Orbiter Processing Facility bay 2. This inspection was performed to identify debris impact damage and, if possible, debris sources.

The Orbiter TPS sustained a total of 144 hits of which 25 had a major dimension of 1-inch or larger. This total does not include the numerous hits on the base heat shields attributed to SSME vibration/acoustics and exhaust plume recirculation.

The following table lists the STS-105 Orbiter damage hits by area:

	<u>HITS > 1-inch</u>	<u>TOTAL HITS</u>
Lower Surface	15	108
Upper Surface	2	3
Window Area	8	32
Right Side	0	0
Left Side	0	0
Right OMS Pod	0	1
Left OMS Pod	0	0
TOTALS	25	144

The Orbiter lower surface sustained 108 total hits, of which 15 had a major dimension of 1-inch or larger, both numbers are well within family. The majority of the hits (57 total with 11 greater than 1-inch) were located in the area from the nose landing gear to the main landing gear wheel wells on both left and right chines. The pattern and size ratio of these hits is indicative of damage from ET foam loss. This is the highest number of hits in this area since the implementation of ET intertank foam venting. Analysis of ET separation film will further aid in the determination of debris sources.

Approximately 31 of the total lower surface hits were around the LH2 umbilical area. Most of these damage sites around the ET/ORB umbilical were most likely caused by pieces of the umbilical purge barrier flailing in the airstream and contacting tiles before pulling loose and falling aft.

The largest lower surface tile damage site, located on the LH chine area, measured 5-inches long by 4-inches wide by 0.0625-inches deep. The cause of this damage has not been determined yet.

The landing gear tires were reported to be in good condition.

ET/Orbiter separation devices EO-1, EO-2, and EO-3 functioned normally. No ordnance fragments were found on the runway beneath the umbilicals. The EO-2 and EO-3 fitting retainer

springs appeared to be in nominal configuration, though one of the “salad bowl” clips was missing from EO-3. This condition was present prior to Orbiter/ET mate and was accepted per MR approval for unrestricted use back in 1999 via PR STR-5-14-3015. The EO-2/3 pyro debris shutters were fully closed. No debris was found beneath the umbilicals.

Typical amount of tile damage occurred on the base heat shield. All SSME Dome Heat Shield closeout blankets were in good condition.

Three vertical tail leading edge tile damage sites were observed, with two having a major dimension greater than one inch. There was one tile damage site on the leading edge of the RH OMS Pod.

There were a total of 32 hits, with 8 having one dimension greater than 1-inch, on the window perimeter tiles. Hazing and streaking of forward-facing Orbiter windows appears to be normal

The post-landing walkdown of Runway 15 was performed immediately after landing. All components of the drag chute were recovered and appeared to have functioned normally. Several FOD items were found on the runway. The debris items found were: a 13-inch long, 10-gauge, metallic wire; a 1-inch long by 0.625-inches wide by 0.250 inches thick metal fragment, and numerous pieces of SLF concrete. All of which were found within 10 feet of the center-line. Additionally, there were also numerous pieces of asphalt found on the approach threshold of runway 15.

In summary, the total number of Orbiter TPS debris hits and the number of hits 1-inch or larger were within established family, however the number of hits between the main landing gear well and nose landing gear well is higher than normal. The potential identification of debris damage sources for mission STS-105 will be based on the laboratory analysis of Orbiter post landing microchemical samples, inspection of the recovered SRB components, film analysis, and aerodynamic debris particle trajectory analysis. The results of these analyses will be documented in the STS-105 Debris/Ice/TPS Assessment and Integrated Photographic Analysis report.

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